CLAIMS

1) A device (300; 400) for crossing optical beams, comprising at least first input optical waveguide (302'; 402') directed along a first axis (x_1) and a second optical waveguide (303'; 403') directed along a second axis (x_2) inclined with respect to the first axis, and further comprising an optical crossing region at the intersection of said first and second axis, characterized in that it comprises a photonic crystal (301) having a regular periodicity in said optical crossing region.

2) A device according to claim 1, further comprising a first and a second output optical waveguide (302", 303"; 402", 403") opposite said first and second input optical waveguide (302', 303'; 402', 403') with respect to said crossing region and directed along said first and second axis, respectively.

3) A device according to claim 1, wherein said first and second axis have the same direction of a first and a second crystal axis, respectively.

4) A device according to claim 1, wherein said first and second axis are perpendicular to each other.

5) A device according to claim 4, wherein said photonic crystal extends in a square or rectangular portion of an optical integrated structure and wherein said first and second input optical waveguides are coupled to respective edges of said portion.

6) A device according to claim 4, wherein the photonic crystal has a periodic array of holes arranged according to a square geometry.

7) A device according to claim 1, wherein said first and second directions define and angle of $\pi/3$.

8) A device according to claim 7, wherein said photonic crystal extends in a substantially hexagonal portion of an optical integrated structure and wherein said first and second input optical waveguides are coupled to respective edges of said portion.

9) A device according to claim 7, wherein the photonic crystal has a

periodic array of holes (2) arranged according to a triangular geometry.

10) A device according to claim 7, further comprising a third input optical waveguide (304') directed along a third axis that intersects said first and second axis in said crossing region.

11) A device according to claim 10, further comprising a third output optical waveguide (304") opposite said third input optical waveguide (304') with respect to said crossing region and directed along said third axis.

12) A device according to claim 1, wherein at least one of said first and second input optical waveguide is an integrated waveguide.

13) A device according to claim 1, wherein at least one of said first and second input optical waveguide is an optical fibre.

14) A device according to claim 1, wherein said optical beams have predetermined wavelengths, wherein the photonic crystal is made of a bulk material having a first refractive index and includes a periodic array of regions having a second refractive index different from the first and having predetermined dimensions, and wherein the difference between said first and second refractive indices, the dimensions of said regions and the period of said array are so related to each other and to said wavelengths that, starting from a isotropic distribution of the wave vectors of said electromagnetic radiation within a first angular range that is twice the angular extension of the first Irreducible Brillouin zone of said photonic crystal, the group velocity vectors corresponding to said wave vectors are rearranged during propagation in said photonic crystal that at least 50% of the group velocity vectors are directed within a second angular range that is about one-third of said first angular range and the width at half-maximum of the distribution of the modules of the velocity group vectors is lower than about two-third of said second angular range.